A SURVEY OF THE SPECIES AND DISTRIBUTION OF AEDES AT SEAPORTS AND AIRPORTS OF IRIAN JAYA

Sumengen*

Walaupun penyakit demam berdarah terdapat dimana-mana didaerah Asia Tenggara termasuk Indonesia, namun demikian belum pernah dilaporkan adanya di propinsi Irian Jaya. Vector utama penyakit tersebut adalah A. (Stegomya) aegypti meskipun A. (S) albopictus juga dapat menjadi vectornya. Penyakit lain yang terpenting dapat ditularkan oleh A. aegypti ialah yellow fever, dimana virusnya hanya terdapat di Afrika dan Amerika. Mengingat letak geografis yang sangat dekat dan kommunikasi yang regular baik melalui laut dan udara dengan negara-negara seperti Philipana, Thailand, Singapura, Vietnam, India, Ceylon dan Indonesia, maka setiap saat kedua penyakit tersebut kemungkinan dapat menginfeksi penduduk Irian Jaya. Untuk membantu mempelajari apakah infeksi dapat terjadi maka dari bulan September sampai dengan Desember 1968 telah dilakukan survey pendahuluan untuk mengetahui species Aedes yang ada dan distribusinya di pelabuhan-pelabuhan laut maupun udara terpenting di Irian Jaya. Survey ini dilakukan dengan cara mengadakan penangkapan serta pemeriksaan nyamuk dan larva yang terdapat pada setiap bangunan didaerah pelabuhan laut maupun udara.

Berdasarkan hasil survey yang dilakukan ternyata ditemukan adanya 7 species Aedes yaitu, A. aegypti, A. albopictus, A. (S) scutellaris, A. (Finlaya) kochi, A. (Ochlerotatus) vigilax, A. (S) alboleneatus, dan A. (F) novalbitarsis. Walaupun Van Den Assem & Bonne Wepster (1964) menyatakan bahwa sebagian besar di wilayah Irian Jaya masih belum ditemukan adanya A. aegypti tetapi pada penelitian ini ternyata dari 11 pelabuhan laut dan udara, 9 diantaranya ditemukan A. aegypti. Timbulnya A. aegypti pada beberapa kota diwilayah Irian Jaya pada tahun 1968 mungkin disebabkan karena pemindahan vector tersebut dari daerah-daerah lain melalui kapal laut maupun udara yang merupakan alat pengangkut dari satu daerah kedaerah lain.

Epidemics of dengue haemorrhagic fever have been recorded since 1954 in Manila and other areas of Philippines, 1958 in Bangkok and Thailand, 1960 in Singapore, 1963 in South Viet-Nam, 1963–1964 in Calcuta, Viskhapatman and Madras India, since 1965 in Ceylon and since 1969 in Indonesia. This disease is now considered to be a major health problem in South-East Asia and the Western Pasific. Although dengue haemorrhagic fever is now widely established in South-East Asia it has not been reported anywhere on the island of Irian Jaya.

The principal and usually the only vector of dengue haemorrhagic fever is *Aedes (Stegomya) aegypti*, although *A.(S) albopictus* has ocassionally been involved (Rudnick & Chan, 1965; Gould et al., 1968). The other important disease transmitted by *A. aegypti* is yellow fever, which is present in vast areas in Africa and America. The proximity of, and the regular traffic with the Philippines, Thailand, Singaporee Viet-Nam, India, Ceylon and Indonesia, suggest that the risk of both diseases being introduced is very high.

In order to help to assess whether these infections could become established, a preliminary survey was made between September and December 1968 of species and distribution of *Aedes*, especially *A. aegypti* in important sea and airports of Irian Jaya. J. Bonne Wepster (1928) reported several species of Aedes and their distribution as follows: *A. aegypti* and *A. (S) scutellaris* in Fak-Fak, *A. (S). albopictus* in Manokwari, *A. aegypti* in Pionirbivak, *A. aegypti* and *A. albopictus* in Tanah Merah.

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DISCRIPTION OF THE AREA

Irian Jaya has an area of about 410,660 km2 and bordered by the Territory of Papua and New-Guinea on the east and separated from Indonesian Territory by the sea. The climate is equatorial, hot and humid but the high-lands have a much cooler climate. Rainfall is heavy, only a small part receiving less than 1,524 mm annually. On the north coast rainfall is generally about 2,540 mm, other places receive much more. November–April is the season of the north west monsoon, which brings heavy rain to all parts of the island and especially the north coast. May–October is the season of the southeast trade winds, during which in this period in Merauke regency is the dry season.

The temperature of the lowlands fluctuates slightly around 27°C throughout the year. Temperature in March or April and in October or November average around 27°.8°C falling sometimes to 26.7°C in July and January. On the south coast where there is the dry season, the highest mean monthly temperature is in December and January attaining 27.8°C and the lowest in June and July 25.6°C.

The population of Irian Jaya is about 815,904 (1968) concentrated mainly along the coast where there are seaports. The communication from one town to another is usually by air and sea. There is no road transport facilities connecting one town to the other.

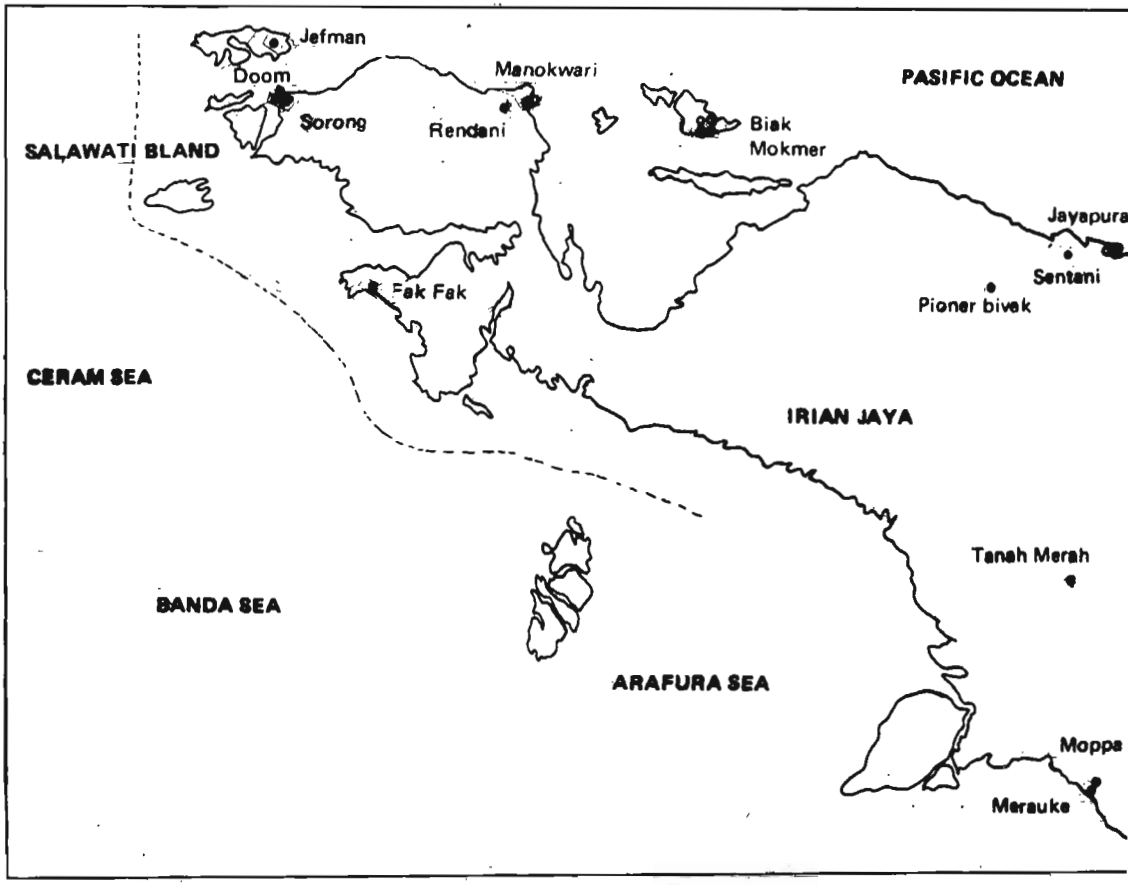

Fig. Distribution of *A. aegypti* in Irian Jaya. Solid circle *A. aegypti* present and open circle *A. albopictus* present. Jayaputa, Biak, Manokwari, Sorong and Merauke are capitals of regencies where there are sea and airports.

MATERIALS AND METHODS

The surveys were done at the important seaports of Jayapura, Biak, Manokwari, Sorong, Doom, Merauke and airports of Sentani, Mokmer, Rendani, Jefman, Moppa (see fig.). All the buildings and houses within a radius of 5 km around the seaports and airports were inspected for the collection of larvae and mosquitoes of Aedes.

The larvae were collected from breeding places, that is in and around the houses to a distance of about 20 m. All potential breeding places indoors and outdoors were inspected, then larvae collected. Larvae were collected by water scoop using the method of picking up two-three larvae per container and then put away in small bottles or tubes which were coded. This code corresponded to the protocol of the collection of larvae. The mosquitoes were collected from their hiding places, indoors and outdoors and transfered and kept in mosquito cages. All collecting activities of larvae and adult mosquitoes were done between 07:00 to 14:00 o'clock. Collected larvae and adult mosquitoes were brought to the laboratory of the Regency Health Services, and prepared for determination. Larvae belonging to the genera of Anopheles and Culex were separated. Separation was done by loupe and a small pipette. Larvae of the genus Aedes put away in bottles and kept alive, given dried, ground shrimp as its food. After several days, some of the larvae became adults, and they were taken out of the first bottle and put in another bottle where they were killed by chloroform. The dead mosquitoes were fixed on small needles, and then identified by 10 x loupe according to the key of J. Bonne Wepster (1932) and Reference Mosquito Collection of the Provincial Health Services. Some larvae were identified microscopically and the results of both determinations were listed on special forms. For documentation purposes several mosquitoes were put away in mosquitoes boxes.

RESULTS

Breeding and hiding places were mostly found in houses, ware-houses, shops and restaurants. The breeding places where these larvae were collected were vessels, throughs, tins for water storage, broken bottles, coconut shells drums, tyres, flower pot plates, tree holes, bamboo stumps and leaf axillae.

The water in the containers was always very clear and free from any contamination. All that mosquitoes found at the resting and hiding places were collected. The following table shows the

Table 1. The house indices of *A. aegypti* and *A. albopictus* at the sea and airports of Irian Jaya (1968).

Sea and airports	No. of houses examined	No. of houses with mosquito larvae		Houses indices	
		A. aegypti	*A. albopictus*	*A. aegypti*	*A. albopictus*
Jayapura	124	1	4	0.8	3.2
Sentani*	109	1	–	0.9	–
Biak	225	2	8	0.9	3.6
Mokmer*	191	2	4	1.0	2.1
Manokwari	436	25	2	5.9	0.4
Rendani*	92	9	–	9.8	–
Sorong	367	–	3	–	0.8
Doom	196	17	5	8.7	2.6
Jefman*	42	–	1	–	2.4
Merauke	387	1	–	0.3	–
Moppa*	155	1	–	0.6	–

* airports

results of the survey and 7 (seven) species of Aedes present at the sea and airports of Irian Jaya, namely *A. aegypti, A. albopictus, A. scutellaris, A. (Finlaya) kochi, A. (Ochlerotatus) vigilax, A. (S). albolineatus,* and *A. (F.) novalbitarsis.*

The distribution of the species are described in table 1 and 2.

the most common was A. aegypti. In Jefmar the most abundant species was *A. scutellaris* than was *A. albopictus.* At the seaport of Merauke and airport of Moppa there were only the *A. aegypti* and *A. kochi* the second being more abundant.

The highest *A. aegypti* house index was found at the airport of Rendani namely 9.8 per cent.

Table 2. Distribution of the species of *Aedes* at the sea and airports of Irian Jaya (1968).

Sea and airports	No. of larvae (mosquitoes) collected	Number of larvae (mosquitoes) identified (Species of *Aedes*)							
		A.aeg.	*A.alb.*	*A.scut.*	*A.koc.*	*A.vig.*	*A.alb.*	*A.nv.*	*Anf.Cu.*
Jayapura	61(95)	1(0)	4(6)	51(59)	–(–)	1(–)	3(–)	1(–)	–(30)
Sentani*	24(37)	1(–)	–(–)	13(36)	–(–)	–(–)	–(–)	–(–)	10(1)
Biak	88(132)	3(1)	32(72)	28(36)	–(–)	–(–)	–(–)	–(–)	25(23)
Mokmer*	113(90)	4(–)	17(12)	44(63)	–(–)	–(–)	–(–)	–(–)	48(15)
Manokwari	124(283)	98(216)	7(12)	–(–)	–(–)	–(–)	–(–)	–(–)	19(55)
Rendani*	17(20)	3(19)	–(–)	–(–)	–(–)	–(–)	–(–)	–(–)	14(1)
Sorong	72(45)	–(–)	7(23)	25(22)	–(–)	–(–)	–(–)	–(–)	40(–)
Doom	161(254)	85(140)	24(8)	–(5)	–(–)	–(–)	–(–)	–(–)	52(101)
Jefman*	67(33)	–(–)	3(3)	12(14)	–(–)	–(–)	–(–)	–(–)	52(16)
Merauke	114(120)	2(–)	–(–)	–(–)	6(8)	–(–)	–(–)	–(–)	106(112)
Moppa*	44(34)	1(–)	–(–)	–(–)	6(2)	–(–)	–(–)	–(–)	37(32)

* airports

A.aeg. = *A. aegypti* *A.alb.* = *A.albolincatus*
A.alb. = *A. albopictus* *A.vig.* = *A. vigilax*
A.scut = *A. scutellaris* *A.nv.* = *A.novalbitarsis*
A.koc. = *A. kochi* *An &Cu = Anopheles & Culex*

The dominant species at the seaport of Jayapura were *A. scutellaris* and *A. albopictus.* Other species were *A. albolineatus, A. aegypti, A. vigilax* and *A. novalbitarsis.* The only species at the airport of Sentani was *A. scutellaris. A. aegypti* and there were no other species discovered at this airport. Only three species were discovered at the seaport of Biak and the most common were *A. albopictus* and *A. scutellaris.* The only species in Mokmer were *A. aegypti, A. albopictus* and *A. scutellaris.* At the seaport of Manokwari 79 per cent of the collected mosquitos were *A. aegypti* and at the airport of Rendani the only species was *A. aegypti.* At the seaport of Sorong there were *A. albopictus* and *A. scutellaris, A. albopictus* were more abundant than *A. scutellaris.* In Doom there were *A. aegypti, A. albopictus* and *A. scutellarism* and

The next were Doom 8.7 per cent, Manokwari 5.7 per cent, Mokmer 1 per cent. The other sea and airports were less than 1 per cent.

The highest *A. albopictus* houses indices were found at the sea and airports of Biak 3.6 per cent, Jayapura 3.2 per cent, Mokmer 2.1 per cent, Doom 2.6 per cent, Jefman 2.4 per cent, the other sea and airports were less than 1 per cent.

DISCUSSION

In this present study seven species found at the important sea and airports were *A. aegypti, A. albopictus, A. scutellaris, A. kochi, A. vigilax, A. albolineatus* and *A. novalbitarsis.*

The possibility of the transportation of living insects by aircrafts and ships (Griffitts & Griffitts, 1931; Hicks and Diwan Chand, 1936)

might have resulted the presence of *A. aegypti* in several sea and airports from Fak-Fak, Pionirbivak and Tanah Merah because of the proximity and regular traffic communication by air and sea. Van Dens Assem and Bonne Wepster (1964) stated that at the time of their investigations, *A. aegypti* was still absent from all larger settlements of Irian Jaya.

Four years later this study has shown that in 9 of the 11 most important sea and airports the species was already present, the house index for larvae ranging from 0.3 to 9.8 (average $\bar{x} = 2.6$). A. albopictus was found in 8 places, the house index ranging from 0.4 to 3.6 (average $\bar{x} = 1.4$). Since 1963, Irian Jaya is becoming more important as communications are more regular and frequent with other areas, both by sea and air. According to Griffitts and Griffitts, 1931; Hicks and Diwan Chand, 1936 the possibility of the transportation of living insects by aircrafts and ships results the presence of the insects in those areas. The presence of these vectors in 1968 in Irian Jaya may be a source of infection which might be carried out by aircrafts and ships from the other islands or from the neighbouring countries.

In order to get more precise information, complete data is necessary to assess whether the infection could become established, by carrying out further studies on the ecological aspects of the vectors, mainly *A. aegypti.*

SUMMARY

In order to help to asses whether the infection of dengue haemorrhagic fever and yellow fever could became established, a preliminary survey of the species and distribution of Aedes at the important sea and airports of Irian Jaya was carried out in 1968.

Seven species of Aedes were found: *A. aegypti, A. scutellaris, A. albopictus, A. vigilax, A. kochi, A. albolineatus* and *A. novalbitarsis.*

A. aegypti was present at the seaports of Jayapura, Biak, Manokwari, Doom Merauke, and at the airports of Sentani, Mokmer, Rendani, Moppa.

The highest house index was at the airport of Rendani namely 9.8 per cent and the highest index of *A. albopictus* was at the seaport of Biak, namely 3.6 per cent. These indices are very low and probably not much threat of both diseases dengue haemorrhagic fever and yellow fever in the area of Irian Jaya. But the possibility exists of introduction of these diseases in the areas where *A. aegypti* and *A. albopictus* are found.

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